What is claimed is:

1. A solar energy collecting assembly for distilling fluid comprising:

an elongated light-absorbing floor means for absorbing sunlight, said floor means being overlain by a layer of feedstock fluid,

an elongated light-transmitting roof means for allowing the transmission of sunlight, said roof means being situated above said floor means and fixedly attached at its perimeter to said floor means to form an enclosure,

an elongated light-transmitting air partition means, underlying said roof means and overlying said floor means, for partially dividing said enclosure into two tubular air ducts comprising an upper condenser air duct and a lower evaporator air duct, said air partition means being fixedly attached along its perimeter to said roof means and having a first opening near one of its extremities and a second opening near its opposite extremity to allow the free flow of air between said upper and lower air ducts,

a circulating means for circulating air within said enclosure so as to cause said air to enter said lower evaporator air duct through said first opening, to flow along the length of said lower evaporator air duct, to then pass through said second opening into said upper condenser air duct, to then flow along the length of said upper condenser air duct in a direction reverse to its flow direction in said lower evaporator air duct, and then to reenter said lower evaporator air duct by passing through said first opening, said circulating means propelling air with sufficient velocity so as to induce thermal gradients along the lengths of said upper and lower air ducts, said gradients having a temperature differential sufficient to induce the progressive evaporation of feedstock fluid along the length of said lower evaporator air duct and progressive condensation of the vapor of said fluid along the length of said upper condenser air duct to produce a fluid condensate, said thermal gradients having their hotter ends near said second opening and their cooler ends near said first opening.

2. The solar energy collecting assembly of claim **1** wherein said feedstock fluid is water.

3. The solar energy collecting assembly of claim **1** wherein control means are provided for regulating the speed of said circulating means.

4. The solar energy collecting assembly of claim **3** wherein said control means includes either: two or more temperature sensors for sensing the temperature differential along the length of said air ducts, a light-sensing means for sensing the ambient level of incident solar radiation, or a clock means for determining the time of day.

5. The solar energy collecting assembly of claim **1** wherein supply means are provided for conveying feedstock fluid from an external source to said floor means and wherein removal means are also provided for drawing said feedstock fluid from said floor means and conveying it out of

said enclosure and wherein separate removal means are provided for conveying fluid condensate out of said upper condenser air duct.

6. The solar energy collecting assembly of claim **1** wherein spraying means are provided for spraying feedstock fluid into the air of said lower evaporator air duct.

7. The solar energy collecting assembly of claim **1** wherein said floor means are overlain by a solar-energy-absorbing wick means for assisting the humidifcation of air in said lower evaporator air duct.

8. The solar energy collecting assembly of claim **1** wherein said light-transmitting roof means comprises two or more elongated light-transmitting layers attached to one another at their periphery and wherein each of said layers is spaced apart from the other by an insulating air layer.

9. The solar energy collecting assembly of claim **1** wherein said light-transmitting roof means comprises two or more elongated light-transmitting film means attached to one another at their periphery and wherein each of said film means is spaced apart from the other by one or more insulating air layers, each of said insulating air layers being provided with an inflation means to admit outside air.

10. The solar energy collecting assembly of claim **1** wherein said light-transmitting air partition means comprises an elongated light-transmitting film means.

11. The solar energy collecting assembly of claim **1** wherein air vent means are provided to allow outside air to access said enclosure at a location near the air intake of said circulating means so as to permit said enclosure to inflate when said circulating means is operating.

12. The solar energy collecting assembly of claim **11** wherein forcing means are provided to force air through said air vent means into said enclosure.

13. The solar energy collecting assembly of claim **1** wherein the upper surface of said air partition means is hydrophobic and wherein the lower surfaces of said roof means and said air partition means are hydrophilic.

14. The solar energy collecting assembly of claim **1** wherein said floor means is underlain by insulating means for retarding the loss of heat.

15. The solar energy collecting assembly of claim **1** wherein said upper condenser air duct has a smaller cross sectional area at the end of said air duct near said second opening in said air partition means than at the end of said air duct near said first opening in said air partition means.

16. The solar energy collecting assembly of claim **1** wherein a heat exchange pipe means is provided which lies upon and extends along the length of said floor means for transferring heat to said layer of feedstock fluid, said heat exchange pipe means receiving hot fluid from an external

heat source via an inlet pipe entering said enclosure at the end of said enclosure near said second opening in said air partition means and discharging cool fluid via an outlet pipe leaving said enclosure at the end of said enclosure near said first opening in said air partition means.

17. The solar energy collecting assembly of claim **1** wherein a first heat exchanger means is provided for condensing a working fluid and is positioned in one of said air ducts near said first opening in said air partition means, and wherein a second heat exchanger means is provided for evaporating said working fluid and is positioned in one of said air ducts near said second opening in said air partition means, the pressure differential induced in said working fluid between said heat exchangers being used to drive a turbine or heat engine means for performing useful work.

18. The solar energy collecting assembly of claim **1** wherein means are provided for positioning two or more of said assemblies adjacent to one another so that they share in common the same floor means.

19. The solar energy collecting assembly of claim **1** wherein said assembly is inclined and wherein pumping means are provided for pumping feedstock fluid from the lower elevation end to the higher elevation end of said lower evaporator air duct and for applying said fluid to the surface of a fluid-absorbing, solar energy absorbing wick layer covering the floor of said lower evaporator air duct.

20. An solar energy collecting assembly for distilling fluid comprising:

an elongated light-absorbing, thin film floor means for absorbing sunlight, said floor means being overlain by a layer of feedstock fluid,

an elongated light-transmitting, inflatable plastic film roof means for allowing the transmission of sunlight, said roof means being situated above said floor means and fixedly attached at its perimeter to said floor means to form an enclosure,

an elongated light-transmitting, inflatable plastic film air partition means, underlying said roof means and overlying said floor means, for partially dividing said enclosure into two tubular air ducts comprising an upper condenser air duct and a lower evaporator air duct, said air partition means being fixedly attached along its perimeter to said roof means and having a first opening near one of its extremities and a second opening near its opposite extremity to allow the free flow of air between said upper and lower air ducts,

a circulating means for circulating air within said enclosure so as to cause said air to enter said lower evaporator air duct through said first opening, to flow along the length of said lower evaporator air duct, to then pass through said second opening into said upper condenser air duct, to then flow along the length of said upper condenser air duct in a direction reverse to its flow direction in said lower evaporator air duct, and then to reenter said lower evaporator air duct by passing through said first opening, said circulating means propelling air with sufficient velocity so as to induce thermal gradients along the lengths of said upper and lower

air ducts, said gradients having a temperature differential sufficient to induce the progressive evaporation of feedstock fluid along the length of said lower evaporator air duct and progressive condensation of the vapor of said fluid along the length of said upper condenser air duct to produce a fluid condensate, said thermal gradients having their hotter ends near said second opening and their cooler ends near said first opening,

an air vent means to allow outside air to access said enclosure at a location near the air intake of said circulating means so as to permit said enclosure to inflate when said circulating means is operating,

a supply means for conveying feedstock fluid from an external source to said floor means, a removal means for drawing said feedstock fluid from said floor means and conveying it out of said enclosure, and separate removal means for conveying fluid condensate out of said upper condenser air duct.

21. The solar energy collecting assembly of claim **20** wherein control means are provided for regulating the speed of said circulating means.

22. The solar energy collecting assembly of claim **20** wherein said floor means are overlain by a solar-energy-absorbing wick means for assisting the humidifcation of air in said lower evaporator air duct.

23. The solar energy collecting assembly of claim **20** wherein said light-transmitting roof means comprises two or more elongated light-transmitting film means attached to one another at their periphery and wherein each of said film means is spaced apart from the other by one or more insulating air layers, each of said insulating air layers being provided with an inflation means to admit outside air.

24. The solar energy collecting assembly of claim **20** wherein said floor means is underlain by insulating means for retarding the loss of heat.

25. The solar energy collecting assembly of claim **20** wherein said assembly is inclined and wherein pumping means are provided for pumping feedstock fluid from the lower elevation end to the higher elevation end of said lower evaporator air duct and for applying said fluid to the surface of a fluid-absorbing, solar energy absorbing wick layer covering the floor of said lower evaporator air duct.

26. A solar energy collecting assembly for distilling fluid comprising:

a light-absorbing floor means for absorbing sunlight, said floor means being overlain by a layer of feedstock fluid,

a light-transmitting roof means for allowing the transmission of sunlight, said roof means being situated above said floor means and fixedly attached at its perimeter to said floor means to form an enclosure,

a light-transmitting air partition means, underlying said roof means and overlying said floor means, for dividing said enclosure into an upper condenser air duct and a lower evaporator air duct, said air partition means being fixedly attached to said roof means along its perimeter and having two openings to allow the free flow of air between said upper and lower air ducts, one of said openings being situated near the geometrical center of said air partition means and the other of said openings being situated along the periphery of said air partition means,

a circulating means for circulating air within said enclosure so as to cause said air to enter said lower evaporator air duct through a first of said openings, to flow through said lower evaporator air duct, to then pass through the second of said openings into said upper condenser air duct, to then flow through said upper condenser air duct in a direction generally reverse to its flow direction in said lower evaporator air duct, and then to reenter said lower evaporator air duct by passing again through said first opening, said circulating means propelling air with sufficient velocity so as to induce thermal gradients along the direction of air flow through said upper and lower air ducts, said gradients having temperature differentials sufficient to induce the progressive evaporation of feedstock fluid along the direction of air flow through said lower evaporator air duct and the progressive condensation of the vapor of said fluid along the direction of air flow through said upper condenser air duct to produce a fluid condensate, said gradients having their hotter ends near said second opening and their cooler ends near said first opening.

27. The solar energy collecting assembly of claim **26** wherein said feedstock fluid is water.

28. The solar energy collecting assembly of claim **26** wherein control means are provided for regulating the speed of said circulating means.

29. The solar energy collecting assembly of claim **28** wherein said control means includes either: two or more temperature sensors for sensing the temperature differential along the length of said air ducts, a light-sensing means for sensing the ambient level of incident solar radiation, or a clock means for determining the time of day.

30. The solar energy collecting assembly of claim **26** wherein supply means are provided for conveying feedstock fluid from an external source to said floor means and wherein removal means are also provided for drawing said feedstock fluid from said floor means and conveying it out of said enclosure and wherein separate removal means are provided for conveying fluid condensate out of said upper condenser air duct.

31. The solar energy collecting assembly of claim **26** wherein spraying means are provided for spraying feedstock fluid into the air of said lower evaporator air duct.

32. The solar energy collecting assembly of claim **26** wherein said floor means are overlain by a solar-energy-absorbing wick means for assisting the humidifcation of air in said lower evaporator

air duct.

33. The solar energy collecting assembly of claim **26** wherein said light-transmitting roof means comprises two or more light-transmitting layers attached to one another at their periphery and wherein each of said layers is spaced apart from the other by an insulating air layer.

34 The solar energy collecting assembly of claim **26** wherein said light-transmitting roof means comprises two or more light-transmitting film means attached to one another at their periphery and wherein each of said film means is spaced apart from the other by one or more insulating air layers, each of said air layers being provided with an inflation means to admit outside air.

35. The solar energy collecting assembly of claim **26** wherein said light-transmitting air partition means comprises a light-transmitting film means.

36. The solar energy collecting assembly of claim **26** wherein support means are provided to support said light transmitting air partition means and said roof means to provide unrestricted air flow through said upper and lower air ducts.

37. The solar energy collecting assembly of claim **26** wherein air vent means are provided to allow outside air to access said enclosure at a location near the air intake of said circulating means so as to permit said enclosure to inflate when said circulating means is operating.

38. The solar energy collecting assembly of claim **26** wherein the upper surface of said air partition means is hydrophobic and wherein the lower surfaces of said roof means and said air partition means are hydrophilic.

39. The solar energy collecting assembly of claim **26** wherein said floor means is underlain by insulating means for retarding the loss of heat.

40. The solar energy collecting assembly of claim **26** wherein the cross sectional area of said upper condenser air duct is smaller near said second opening than it is near said first opening.

41. The solar energy collecting assembly of claim **26** wherein a heat exchange pipe means is provided which lies upon and extends along said floor means for transferring heat to said layer of feedstock fluid, said heat exchange pipe means receiving hot fluid from an external heat source via an inlet pipe entering said enclosure at a location near said second opening in said air partition means and discharging cool fluid via an outlet pipe leaving said enclosure at a location near said first opening in said air partition means.

42. The solar energy collecting assembly of claim **26** wherein a first heat exchanger means is provided for condensing a working fluid, said first heat exchanger means being positioned in one of said air ducts near said first opening in said air partition means, and wherein a second heat exchanger means is provided for evaporating said working fluid and which is positioned inside said enclosure near said second opening in said air partition means, the pressure differential induced in

said working fluid between said heat exchangers being used to drive a turbine or heat engine means for performing useful work.

43. The solar energy collecting assembly of claim **42** wherein said second heat exchanger means is instead positioned outside said enclosure and is separately cooled by a flow of air or water.

44. A solar energy collecting assembly for distilling fluid comprising:

a light-absorbing floor means for absorbing sunlight, said floor means being overlain by a layer of feedstock fluid,

a light-transmitting roof means for allowing the transmission of sunlight, said roof means being situated above said floor means and being fixedly attached at its perimeter to said floor means to form an enclosure,

a light-transmitting air partition means, underlying said roof means and overlying said floor means, for dividing said enclosure into an upper condenser air duct and a lower evaporator air duct, said air partition means being fixedly attached to said roof means along its perimeter and having a communicating opening to allow the free flow of air between said upper and lower air ducts,

an inlet air passage means connecting with said lower evaporator air duct for admitting air to said enclosure and an outlet air passage means connecting with said upper condenser air duct for exhausting air from said enclosure, said air passage means both being located at an extremity of said enclosure that is distant from the location of said communicating opening,

a circulating means for circulating air within said enclosure so as to cause outside air to enter said lower evaporator air duct through said inlet air passage means, to flow along the length of said lower evaporator air duct, to then pass through said communicating opening into said upper condenser air duct, to then flow through said upper condenser air duct in a direction reverse to its flow direction in said lower evaporator air duct, and finally to exhaust from said upper condenser air duct by passing through said outlet air passage means, said circulating means propelling air with sufficient velocity so as to induce thermal gradients along the direction of air flow through said upper and lower air ducts, said gradients having temperature differentials sufficient to induce the progressive evaporation of feedstock fluid along the along the direction of air flow through said lower evaporator air duct and the progressive condensation of the vapor of said fluid along the direction of air flow through said upper condenser air duct to produce a fluid condensate, said gradients having their hotter ends near said communicating opening and their cooler ends near said air passage means.

45. The solar energy collecting assembly of claim **44** wherein said feedstock fluid is water.

46. The solar energy collecting assembly of claim **44** wherein control means are provided for regulating the speed of said circulating means.

47. The solar energy collecting assembly of claim **46** wherein said control means includes either: two or more temperature sensors for sensing the temperature differential along the length of said air ducts, a light-sensing means for sensing the ambient level of incident solar radiation, or a clock means for determining the time of day.

48. The solar energy collecting assembly of claim **44** wherein supply means are provided for conveying feedstock fluid from an external source to said floor means and wherein removal means are also provided for drawing said feedstock fluid from said floor means and conveying it out of said enclosure and wherein separate removal means are provided for conveying fluid condensate out of said upper condenser air duct.

49. The solar energy collecting assembly of claim **44** wherein spraying means are provided for spraying feedstock fluid into the air of said lower evaporator air duct.

50. The solar energy collecting assembly of claim **44** wherein said floor means are overlain by a solar-energy-absorbing wick means for assisting the humidifcation of air in said lower evaporator air duct.

51. The solar energy collecting assembly of claim **44** wherein said light-transmitting roof means comprises two or more light-transmitting layers attached to one another at their periphery and wherein each of said layers is spaced apart from the other by an insulating air layer.

52. The solar energy collecting assembly of claim **44** wherein said light-transmitting roof means comprises two or more light-transmitting film means attached to one another at their periphery and wherein each of said film means is spaced apart from the other by one or more insulating air layers, each of said air layers being provided with an inflation means to admit outside air.

53. The solar energy collecting assembly of claim **44** wherein said light-transmitting air partition means comprises a light-transmitting film means.

54. The solar energy collecting assembly of claim **44** wherein support means are provided to support said light transmitting air partition means and said roof means to provide unrestricted air flow through said upper and lower air ducts.

55. The solar energy collecting assembly of claim **44** wherein the upper surface of said air partition means is hydrophobic and wherein the lower surfaces of said roof means and said air partition means are hydrophilic.

56. The solar energy collecting assembly of claim **44** wherein said floor means is underlain by insulating means for retarding the loss of heat.

57. The solar energy collecting assembly of claim **44** wherein the cross sectional area of said upper condenser air duct is smaller near said communicating opening than it is near said outlet air passage means.

58. The solar energy collecting assembly of claim **44** wherein a heat exchange pipe means is provided which lies upon and extends along said floor means for transferring heat to said layer of feedstock fluid, said heat exchange pipe means receiving hot fluid from an external heat source via an inlet pipe entering said enclosure at a location near said communicating opening in said air partition means and discharging cool fluid via an outlet pipe leaving said enclosure at a location near said air passage means.

59. The solar energy collecting assembly of claim **44** wherein a first heat exchanger means is provided for condensing a working fluid, said first heat exchanger means being positioned in said lower air duct near said inlet air passage means, and wherein a second heat exchanger means is provided for evaporating said working fluid, said second heat exchanger means being positioned in one of said air ducts near said communicating opening, the pressure differential induced in said working fluid between said heat exchangers being used to drive a turbine or heat engine means for performing useful work.